



Taxonomic Review of the Genus *Torodora* Meyrick in Thailand, with Descriptions of Fifteen New Species (Lepidoptera: Lecithoceridae)

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Abstract Fifteen species of the genus *Torodora* Meyrick (*karsholti* sp. nov., *loeica* sp. nov., *fuscobasalis* sp. nov., *epiphorana* sp. nov., *epitriona* sp. nov., *spinula* sp. nov., *longilobella* sp. nov., *lineata* sp. nov., *epicharis* sp. nov., *aritari* sp. nov., *chumponica* sp. nov., *pentagona* sp. nov., *moriyasu* sp. nov., *sagmaria* sp. nov., and *chiangdoica* sp. nov.) are described from Thailand, and three species of the genus (*flavescens* Gozmany, *parotidosa* Wu, and *pegasana* Wu & Liu) are reported for the first time from Thailand. The genus *Toxotarca* Wu is synonymized with *Torodora* Meyrick. Photographs of the imago and illustrations of male and female genitalia are given as available.

Key words Systematics, Description, Torodorinae, Fauna

INTRODUCTION

Genus *Torodora* comprises 85 species which are mostly distributed in the Oriental Region, except a species from Senegal, Africa. The distributional range of the genus in Asia is extended from India to SE Asia, including Borneo and Philippines, and a part of them are distributed in the southern border of the Palaearctic Region. After the work by Gozmany (1978), Wu (1994, 1997) reviewed Chinese species with 37 species, and Wu and Park (1999) reviewed nine species of the genus in Sri Lanka, and recently Park and Heppner (2000) enumerated six species of the genus, describing two new species from Taiwan. This paper represents the 2nd report of the Lecithoceridae for Thailand, since Park (2001) described *Tisis nielsenii* from Thailand. The genus is generally characterized by the venation of wings: Forewing with M_1 arising far from stalk of R_{3+4+5} , M_1 and M_2 almost parallel, M_2 and M_3 free, CuA_1 and CuA_2 stalked; hindwing with all veins free; M_2 remote from M_3 ; M_3 and CuA_1 connate or stalked; cells closed in both wings. However, there are considerable variations in the condition of M_2 and M_3 on the forewing, and M_3 and CuA_1 on the hindwing as suggested by Park (2000). In this paper, 18 species, including descriptions of 15 new species, are recognized from Thailand. However, this is a preliminary study based on a limited material, thus more additional species are expected to be found by further expeditions.

Material examined in this study was largely based on specimens collected in Thailand by Japanese workers; Drs. H. Kuroko, S. Moriuti, T. Saito, Y. Arita, and Y. Yoshiyasu from the Lepidopterological expeditions to Thailand in 1981, 1983, 1985, and 1987, and preserved in the collection of the University of Osaka Prefecture (UOP), Japan, and the collection of the US National Museum (USNM), Wash. D.C., USA. A part of the material was based on the

collection of the Zoological Museum, Copenhagen (ZMC), Denmark, collected by Mr. O. Karsholt and his colleagues from Thailand in 1984, and on the collection of the Museum für Naturkunde der Humboldt-Universität Berlin (MNHU), Germany, collected by W. Mey (1996) and Mey & Spiedel (1997) in Thailand. The color standard for the description of the adult vestiture was based on "Metheun Handbook of Colour" by Kornerup and Wanscher (1978).

SYSTEMATICS

Genus *Torodora* Meyrick

Trans. ent. Soc. Lond., 1894: 16. Type species: *T. characteris* Meyrick, 1894 [Burma]

Habrogenes Meyrick, 1918, Exot. Microl. 2: 102 [N. India].

Panplatyceros Diakonoff, 1952, Ark. Zool. 3: 76 [N.E. Burma].

Torodora karsholti Park, sp. nov.

(Figs. 1, 19, 19a-b, 38)

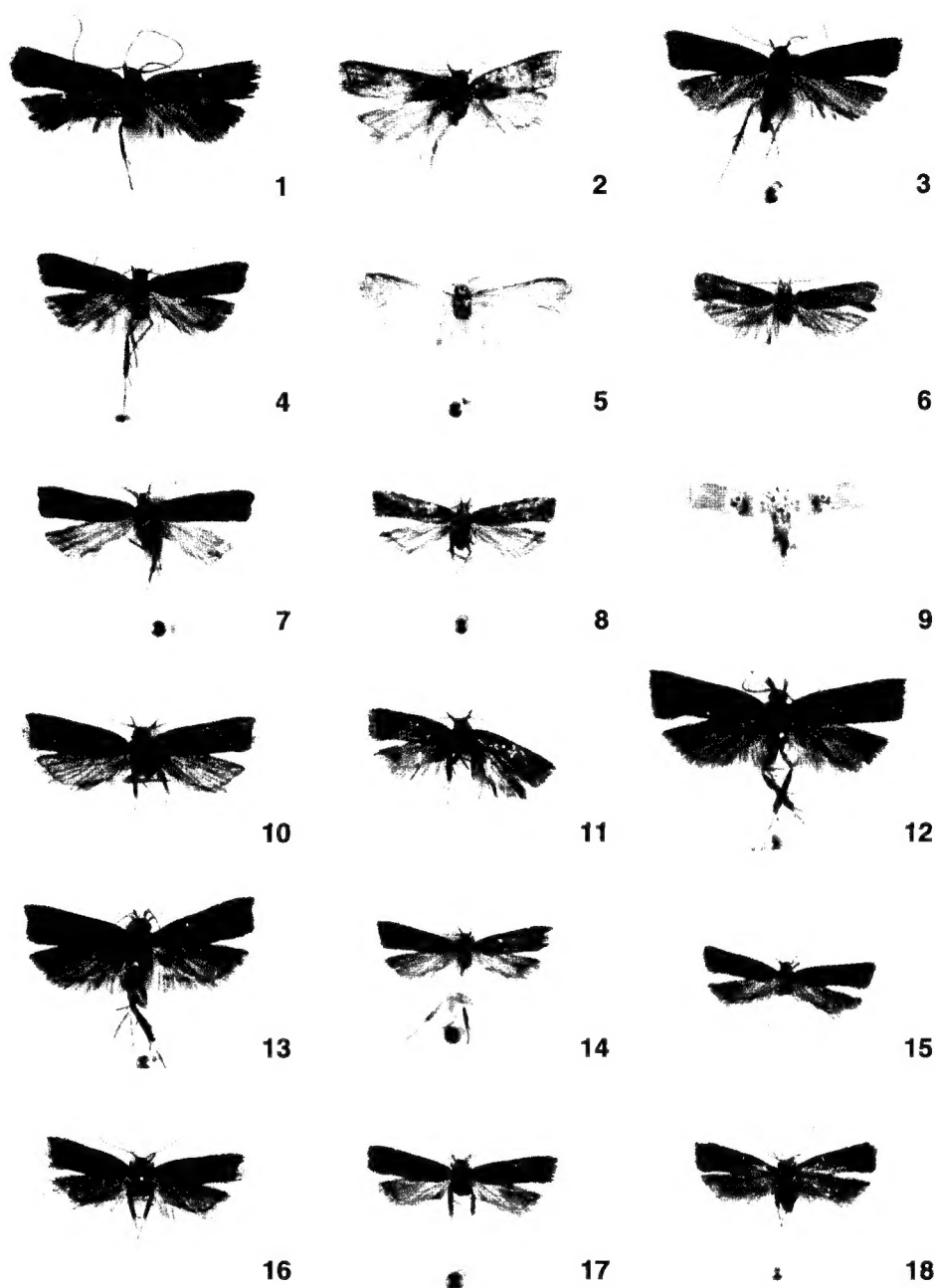
Diagnosis. This new species is superficially close to *T. diakonoffi* Gozmany, but it differs from the latter by the smaller size and the shape of the antemedian fascia in the forewing. They can be easily separable from each other by the male genitalia.

Description. Male and female. Wingspan, 16–18 mm. Head light brown, appressed with broad scales on vertex, sidetufts somewhat erected. Tegula and thorax brown. Antenna with pedicel elongated, pale grayish orange; flagellum with dark brown annulations, not ciliated. Labial palpus strongly recurved; 2nd segment thickened with appressed scales, grayish brown outwardly, white orange at apical 1/3; 3rd segment very long, longer than 2nd, grayish brown throughout. Forewing elongate; fascia dark at base, with a small trapezoidal spot at basal 1/3 of costa; large dark brown fascia well presented near basal 1/3 between R and A veins; two small dark discal spots presented at upper and lower angle of cell; postmedian fascia inconspicuous; apex somewhat acute; termen strongly sinuate below apex, with about 10 dark brown spots along margin from 3/4 of costa to beyond tornus. Venation with R₃ stalked near middle; R₄ and R₅ stalked near distal 3/4; R₅ to termen; M₂ and M₃ remote at base. Hindwing pale gray; apex relatively acute; M₃ and CuA₁ shortly stalked.

Male genitalia (Figs. 19, 19a–b). Uncus relatively long; apex more or less acute. Gnathos slender, long. Valva elongate; costa incurved medially followed by expansion near 2/3; small emargination before middle on ventral margin; distal part broadened with round outer margin, bearing numerous strong bristles from expansion of costa to 2/3 of ventral margin along near margin. Juxta with large, somewhat clavate lateral arms and median process anteriorly; distal margin emarginated. Aedeagus about 3/4 length of valva, almost straight, narrowed toward apex; two rows of strong particles presented at middle, some weak particles beyond it, and somewhat free spatulate preapical process.

Female genitalia (Fig. 38). Eighth sternite weakly sclerotized, deeply emarginate into U-shape on distal margin. Ostium membranous; ductus bursae long, coiled 4–5 times; ductus seminalis arising between 1st and 2nd coil, narrow, with numerous small denticles on inner surface. Corpus bursae very long, about 3/4 length of ductus bursae; signum beltlike long plate, bearing numerous denticles on surface, about 3/4 length of corpus bursae.

Types. Holotype: male, Nakhon Nayok Prov., Khao Yai Nat. Park, ca. 70 m, 29 IX–6X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. 4834. Paratypes: 2 ♂, 2 ♀, same data as holotype, gen. prep. no. ZMC-2/Park. Types are deposited in the Zoological Museum,



Figs. 1-18. Imagos of *Torodora* spp.: 1. *Torodora karsholti* sp. nov., holotype; 2. *T. loeica* sp. nov., holotype; 3. *T. fuscobasalis* sp. nov., paratype; 4. *T. epiphorana* sp. nov., holotype; 5. *T. epitritona* sp. nov., holotype; 6. *T. spinula* sp. nov., holotype; 7. *T. longilobella* sp. nov., holotype; 8. *T. lineata* sp. nov., holotype; 9. *T. epicharis* sp. nov., paratype; 10. *T. atritai* sp. nov., holotype; 11. *T. chumponica* sp. nov., holotype; 12. *T. parotidosa* Wu; 13. *T. pegasana* Wu & Liu; 14. *T. pentagona* sp. nov., holotype; 15. *T. flavescens* Gozmány; 16. *T. moriyasu* sp. nov., holotype; 17. *T. sagmaria* sp. nov., holotype; 18. *T. chiangdoica* sp. nov., holotype.

Copenhagen (ZMC).

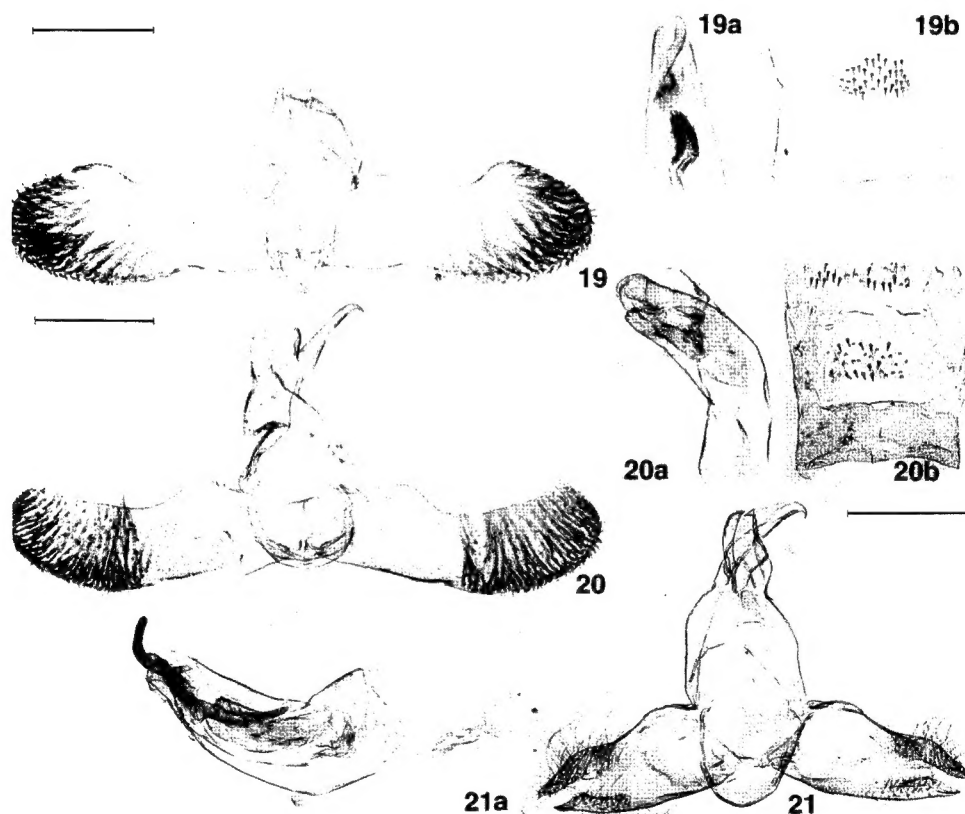
Etymology. *Torodora karsholti* is named in honor of Mr. Ole Karsholt, who is one of collector of the types and a well known microlepidopterist in Denmark.

***Torodora loeica* Park, sp. nov.**

(Figs. 2, 20, 20a-b)

Diagnosis. This new species is similar to *T. octavana* Gozmány, which was described from Khasi Hills, in the superficial and the male genitalic characters, but it differs from the latter by the yellowish brown basal zone and brownish postmedian fascia of the forewing, and CuA₁ free from M₃ in the hindwing, whereas they are stalked in *T. octavana*; in the male genitalia, aedeagus lacks the long needle-shaped cornutus and the bundle of long setae as that of *T. octavana* and also the uncus is short and broad with acute apex.

Description. Male. Wingspan, 16–17 mm. Head orange gray. Thorax brownish gray. Antenna with elongated pedicel, pale grayish orange; flagellum concolorous, without distinct annulations. Labial palpus strongly recurved; 2nd segment much thickened ventrally, dark brown at basal 2/3 outwardly and orange white at apical 3rd; 3rd segment very long, longer than 2nd, dark brown ventrally. Forewing with yellowish brown basal zone, with oblique antemedian



Figs. 19-21. Male genitalia (a: aedeagus, b: 8th segment): 19. *Torodora karsholti* sp. nov.; 20. *T. loeica* sp. nov.; 21. *T. fuscobasalis* sp. nov. (Scale = 0.5 mm).

line; small discal spot just beyond half; apex somewhat acute; outer margin strongly sinuate beyond apex. Venation almost same as that of the preceding species, *T. karsholti*, but M_2 and M_3 close at base. Hindwing pale gray; apex relatively acute; CuA_1 free from M_3 , instead of stalk in *T. octavana*;. Female unknown.

Male genitalia (Figs. 20, 20a–b). Uncus relatively short, broad, with acute apex. Gnathos relatively long, bent apically. Valva foot-shaped; costa expanded near basal 1/4, thence smoothly incurved, whereas somewhat angled in *T. octavana*; distal half densely covered with bristles; outer margin more rounded; ventral margin almost straight. Juxta shield-shaped. Aedeagus bent near middle, as long as valva, with almost parallel margins; apex rounded; cornuti with two sclerites, instead of bundle of long bristles as well as in *T. octavana*.

Type. Holotype: male, Loei Prov., Phu Luang Wildlife Sanc., 700–900 m, 8–14 X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. 4836. Type is deposited in ZMC.

Etymology. The specific name is derived from the geographic locality of the holotype, “Loei” in Thailand.

***Torodora fuscobasalis* Park, sp. nov.**

(Figs. 3, 21, 21a–b)

Diagnosis. This new species is very similar to the following new species in superficial appearance, but it differs from the latter by the dark brown basal part of the forewing, with gently incurved antemedian line. However, the male genitalia quite differs from other species of the genus, with valva incised at apex.

Description. Male. Wingspan, 17 mm. Head, tegula, and thorax brown. Antenna with pedicel moderate, orange gray dorsally and brown ventrally; flagellum without annulations, not ciliate. Labial palpus very long, strongly recurved; 2nd segment thickened with appressed scales ventrally, brown on outer surface, slightly paler in apical 1/3; apex orange white; 3rd segment longer than 2nd, dark brown ventrally and apex. Forewing dark brown before antemedian line which almost straight from costa to hind margin, bordered by creamy white scales and followed by pale brownish gray area; discal spot relatively large, near upper angle of cell; triangular grayish orange costal spot well presented at 4/5; apex somewhat acute; termen strongly sinuate, almost vertical. Venation R_3 stalked with R_{4+5} beyond middle, R_4 and R_5 stalked at near 3/4, CuA_1 and CuA_2 separated from near middle. Hindwing gray with apex sharply pointed; M_3 and CuA_1 almost connate at base. Hindtibia clothed with dark brown scales; apex creamy white.

Male genitalia (Figs. 21, 21a–b). Uncus moderately long, slender. Gnathos very long, with sharply pointed apex. Valva typical shape, differentiated from ordinary members of this genus, with deep incision at apex, densely setose on dorsal surface; costa strongly waved; sacculus extended to apex. Juxta quadrate, with extended lobes at each corners. Aedeagus large, slightly longer than valva; with heavily sclerotized, large digitate apical process, which connected to inner large thorn-like cornutus.

Types. Holotype: male, Chiang Mai Prov., Doi Chiang Dao, ca. 1130 m, 18 X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. 4837. Paratype: 1 ♂, Chiang Mai Prov., Doi Intahanon Nat. Park, ca. 1600 m, 22–24 X 1984 (Karsholt, Lomholdt, and Nielsen). Types are deposited in ZMC.

Etymology. The specific name is derived from the Latin, “*fusc*” (= brown), corresponding to dark brown in the basal half of the forewing.

***Torodora epiphorana* Park, sp. nov.**
(Figs. 4, 22, 22a–b, 38)

Diagnosis. This new species is superficially similar to the preceeding new species, *T. fusco-basalis* sp. nov. but it is differentiated by the somewhat serrated antemedian line and strongly concave termen of the forewing. The male genitalia has the common shape of the *Torodora*, and quite differing from the preceding species as described in the following description. Forewing venation of this species is somewhat different from related species of *Torodora*, with R_2 stalked with R_{3+4+5} , however it is no doubt to place this species in *Torodora*.

Description. Male. Wingspan, 15–16 mm. Head dark brown, lateral tuft pale grayish orange. Tegula and thorax dark brown. Antenna with orange white pedicel, dark-brown longitudinal line well presented centrally; flagellum orange white, with distinct annulations, shortly ciliated. Labial palpus not so strongly recurved; 2nd segment thickened with appressed scales ventrally, dark brown outwardly, orange white preapically; 3rd segment as long as 2nd or shorter, dark brown ventrally and dorsoapically; apex acute. Forewing as similar as the preceding species; with conspicuous subbasal blackish spot and two small discal spots near upper and lower angles; antemedian line oblique; costal patch yellowish, inconspicuously represented at 3/4; termen strongly concave, whereas gently incurved in the preceding species; R_2 stalked with R_{3+4+5} , CuA_1 and CuA_2 stalked beyond middle. Hindwing gray; apex sharply pointed; M_3 and CuA_1 stalked near base. Hindtibia clothed with brown scales dorsolaterally.

Male genitalia (Figs. 22, 22a–b). Uncus slender, curved downwardly. Gnathos relatively small. Valva broad at base, narrowed from basal 2/5 towards apex, bearing dense bristles; costa incurved; apex round. Juxta quadrate with incurved caudal margin; lateral lobes slender, relatively long, sclerotized, slightly bent preapically, bearing short setae at apex. Aedeagus relatively stout, broader towards base, with heavily sclerotized, digitate apical process; cornuti divided into two zones, one with strong spicules and the other with weak spicules. Eighth sternite slightly concave on distal margin.

Female genitalia (Fig. 38). Eighth sternite wide, with small emargination medially on caudal margin. Postvaginalis with spicules. Ostium very wide; antrum membranous. Ductus bursae narrow at distal 1/2 and expanded with numerous short conical spines on inner surface at anterior half, shorter than corpus bursae. Corpus bursae relatively large; signum eyebrow-shaped, sclerotized, with spicules beneath.

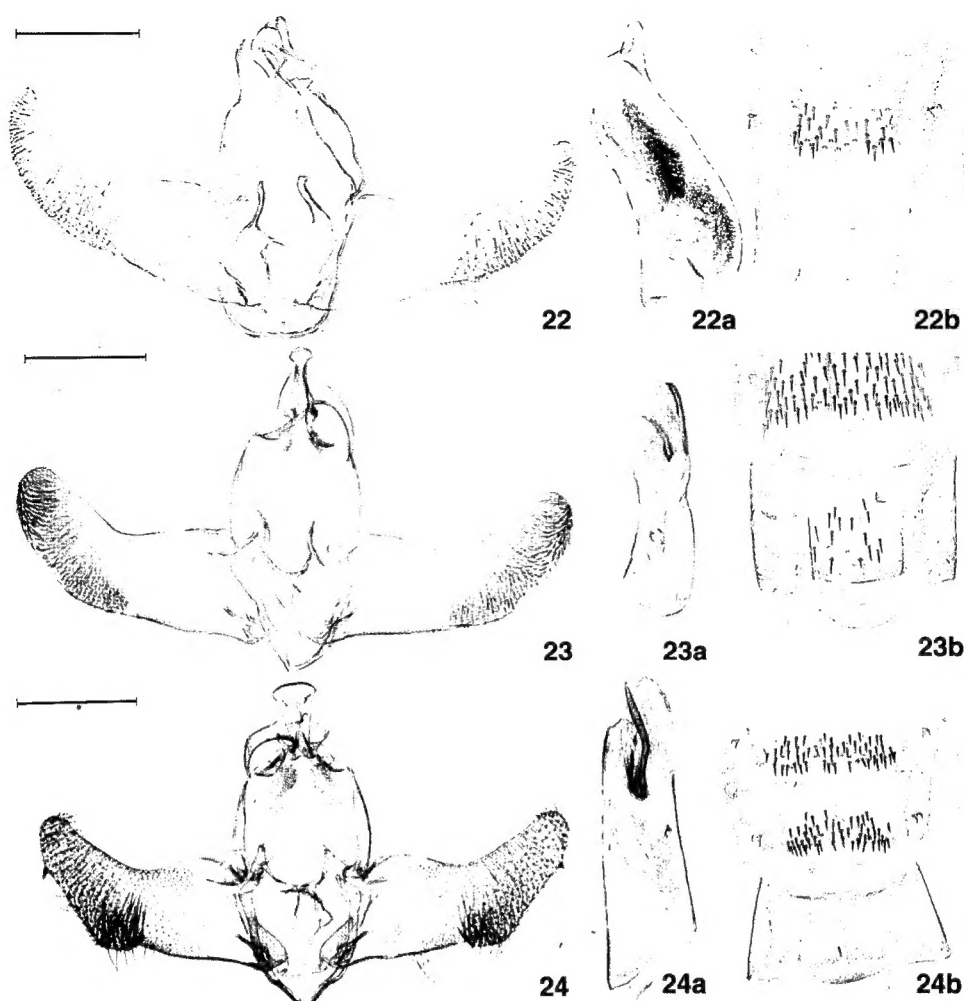
Types. Holotype: male, Chiang Mai Prov., Doi intahanon Nat. Park, ca. 1600 m, 22–24 X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. ZMC-10/Park. Paratypes: 2 ♂, 1 ♀, same data as holotype, gen. prep. no. 4776 (♀). Types are deposited in ZMC.

Etymology. The specific name refers to the Greek, “*epiphor*” (= slanting), corresponding to the oblique median line of the forewing.

***Torodora epitritona* Park, sp. nov.**
(Figs. 5, 23, 23a–b)

Diagnosis. This new species is superficially similar to *T. manoconta* Wu & Liu and the following new species, *spinula* sp. nov., but can be separated by the male genital structures, especially by the clavate uncus, the long, horn-shaped lateral lobes of juxta, and the shape of valva as described in the following text.

Description. Male. Wingspan, 16 mm. Head pale grayish orange. Tegula and thorax light brown. Antenna with pedicel pale grayish orange, shiny, speckling with brown scales dorsally; flagellum pale grayish orange throughout, not ciliate. Second segment of labial palpus thick-



Figs. 22-24. Male genitalia (a: aedeagus, b: 8th segment): 22. *T. epiphorana* sp. nov.; 23. *T. epitritona* sp. nov.; 24. *T. spinula* sp. nov. (Scale = 0.5 mm).

ened with appressed scales, pale grayish orange all around; 3rd segment as long as 2nd, concolorous, speckling with brown scales sparsely. Forewing ground color pale grayish orange, somewhat shiny or almost transparent as well as *manoconta* Wu & Liu, without markings; apex obtuse; termen almost straight; R_3 stalked with R_{4+5} near $1/3$; R_4 and R_5 stalked near $2/3$; R_5 to termen; CuA_1 and CuA_2 separated from basal $1/4$. Hindwing pale grayish orange; apex acute; M_3 and CuA_1 separated from basal $1/3$.

Male genitalia (Figs. 23, 23a-b). Uncus relatively long, clavate. Gnathos gently bent. Valva foot-shaped; costa angled near middle; distal part relatively broad, with dense bristles inner surface. Lateral lobes of juxta horn-shaped, relatively long, with acute apex. Aedeagus shorter than valva, with horn-shaped cornutus. Eighth sternite relatively long, strongly convex on caudal margin medially.

Type. Holotype: male, Chiang Mai Prov., Doi Suthep-pui, ca. 1650 m, 17-28 X 1984 (Kar-

sholt, Lomholdt, and Nielsen), gen. prep. no. 4839. Type is deposited in ZMC.

Etymology. The specific name is derived from the Greek, “*epetrion*”, referring to the needle-shaped lobes of juxta.

***Torodora spinula* Park, sp. nov.**

(Figs. 6, 24, 24a–b)

Diagnosis. This species is hardly distinguishable from *T. manoconta* in the superficial appearance, but it is much smaller than the latter. The male genitalia of this new species is very similar to that of *T. manoconta*, but can be distinguished from the latter by the funnel-shaped uncus, the gnathos strongly bent beyond middle, distal part of valva more narrowed toward apex, with a short spine on outer margin. It is also very similar to the preceding species, but also easily distinguished by the male genitalia.

Description. Male. Wingspan, 13–13.5 mm. Head shiny, pale orange. Tegula and thorax light brown. Antenna shiny, pale orange throughout, not ciliated. Second segment of labial palpus thickened with appressed scales, pale orange all around; 3rd segment as long as 2nd, concolorous. Forewing ground color pale orange, somewhat shiny or almost transparent as well as the preceding species, without markings; apex obtuse; termen almost straight; venation very similar to that of the preceding species. Hindwing pale brownish gray; apex acute; termen strongly sinuate; M_3 and CuA_1 separated from basal 1/3.

Male genitalia (Figs. 24, 24a–b). The whole structure of the genitalia is very closed to *T. manoconta* Wu et Liu, but can be separable from the latter by the followings: uncus funnel-shaped, expanded caudally, with large apex; gnathos strongly bent beyond middle; valva foot-shaped, with short spine beyond 2/3 on outer margin; ventral margin strongly angled beyond middle, thence almost straight before spine; lateral lobes of juxta short, digitate. Aedeagus as long as valva, similar to that of *T. manoconta*, with a long, horn-shaped cornutus. Eighth sternite very short, slightly convex on caudal margin medially.

Type. Holotype: male, Chiang Mai, Ta Ton, 17 (Kuroko, Moriuti, Arita, and Yoshiyasu), gen. prep. no. 4741. Paratype: ♂, Nakhon Nayok, Khao Yai, ca. 800 m, 24 IX 1987 (Kuroko, Moriuti, Arita, and Yoshiyasu). Type is deposited in the University of Osaka Prefecture (UOP).

Etymology. The specific name is derived from the Latin, “*spina*”, corresponding to the thorn-like spine on outer margin of valva.

***Torodora longilobella* Park, sp. nov.**

(Figs. 7, 25, 25a–b)

Diagnosis. This species is separable from its allies by the strongly sinuate termen, well-presented reniform sterigma at end of cell. The male genitalia are also very similar to those of *T. forsteri* Gozmany which was described from Nepal, but can be separated by the extremely long lateral lobes of juxta.

Description. Male. Wingspan, 18 mm. Head with appressed brown scales medially and pale orange gray scales laterally, which extended to end of tegula along its inner margins. Tegula and thorax dark brown. Pedicel of antenna with longitudinal brown line centrally, extending to basal part of flagellum; flagellum not ciliated. Second segment of labial palpus thickened, with appressed scales, more or less extended anteriorly; dark brown on outer surface; 3rd segment slender, strongly angled from 2nd, longer than 2nd, speckling with dark scales. Forewing elongate, relatively narrow; ground color orange white, speckling densely with dark brown scales throughout; costa almost straight; cross lines inconspicuous; small costal patch

before middle, small spot at middle of cell, reniform sterigma near end of cell; apex relatively acute; termen strongly sinuate; fringes with creamy white basal line; venation with R_3 and R_{4+5} stalked about $1/3$; R_4 and R_5 stalked about $2/3$; CuA_1 and CuA_2 shortly stalked. Hindwing almost trapezoidal, gray; apex relatively acute; termen slightly sinuate; M_3 and CuA_1 stalked near middle; fringes concolorous, with a row of grayish brown scales at basal $1/3$, apical $1/4$ speckled with brown and white scales.

Male genitalia (Figs. 25, 25a–b). Uncus bent downwardly; apex acute. Gnathos moderate, bent preapically. Valva broad basally, thence narrowed, with gently incurved costa; ventral margin almost parallel along to costa; apex round. Juxta convex on caudal margin; lateral lobes very long, sticklike, longer than length of juxta; anterior margin sharply convex at middle. Aedeagus relatively long, as long as valva; heavily sclerotized apical $1/3$ on both sides, representing two flaps with round apices; numerous spicules in vesica distally.

Type. Holotype: male, Loei Prov., Phu Luang Wildlife Sanc., 700–900 m, 8–14 X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. 4840. Type is deposited in ZMC.

Etymology. The specific name refers to the long lateral lobes of the juxta in the male genitalia.

***Torodora lineata* Park, sp. nov.**

(Figs. 8, 26, 26a–b)

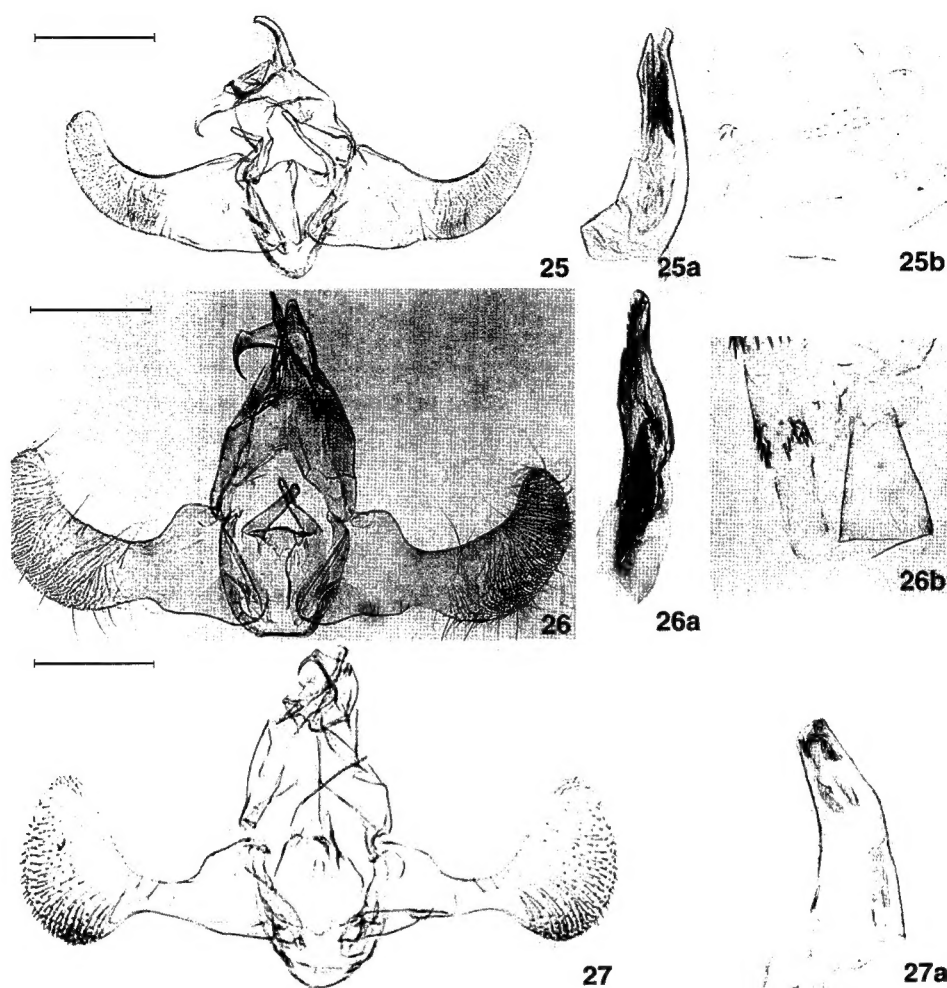
Diagnosis. The wing pattern of the species is similar to that of *T. parallella* Gozmany which is described from Nepal, but it is much smaller in size (23.0 mm in *T. parallella*). It is also close to the preceding species, but the male genitalia differ from each other.

Description. Male. Wingspan, 13.5 mm. Head appressed with pale orange gray scales, shiny. Tegula and thorax dark brown. pedicel of antenna elongate, orange white, with brown longitudinal line centrally on dorsal surface. Second segment of labial palpus thickened with appressed scales ventrally, dark brown outwardly, pale orange apically; 3rd segment slender, longer than 2nd, strongly recurved. Forewing ground color pale grayish orange upper half, with blackish longitudinal fascia from base to near tornus along submedian groove, with two dark discal spots at middle and at end of cell; some other irregular blackish spots or streaks represented; more blackish in inner area of termen; apex more or less acute; termen sinuate; fringes with creamy white basal line; venation with R_3 and R_{4+5} stalked before middle; R_{4+5} and R_5 beyond $2/3$; CuA_1 and CuA_2 stalked before middle. Hindwing with somewhat acute apex; termen oblique.

Male genitalia (Figs. 26, 26a–b). Uncus slender, relatively long, with slight expansion near $2/3$. Gnathos somewhat large, strongly bent preapically. Valva broad at basal $1/4$, thence narrowed; costa strongly concave from basal $1/4$; distal part elongate, foot-shaped; apex round; ventral margin with deep emargination before middle. Juxta quadrate; lateral lobes as long as juxta. Aedeagus shorter than valva, surface sclerotized beyond basal $1/3$, with strong denticles on ventral surface beyond $2/3$; cornuti consist of a bundle of needles and small digitate one with spinelike setae.

Type. Holotype: male, Loei Prov., Phu Luang Wildlife Sanc., 700–900 m, 8–14 X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. 4841. Type is deposited in ZMC.

Etymology. The specific name is derived from the Latin, “linea”, referring to transversal lines on the forewings.



Figs. 25-27. Male genitalia (a: aedeagus, b: 8th segment): 25. *T. longilobella* sp. nov.; 26. *T. lineata* sp. nov.; 27. *T. epicharis* sp. nov. (Scale = 0.5 mm).

***Torodora epicharis* Park, sp. nov.**
(Figs. 9, 27, 27a-b, 39)

Diagnosis. This species is easily differentiated from the previously known species of this genus by the yellowish white color pattern of the forewing. The venation generally agrees to the genus, but M_2 and M_3 on the forewing connate (usually free from each other) in the forewing.

Description. Wingspan, 14.5–15 mm. Head yellowish white or creamy white. Tegula and thorax creamy white, covered with golden yellow scales partly. Pedicel of antenna yellowish white, with blackish scales at apex; flagellum with brownish annulations, paler towards distal end. Second segment of labial palpus thickened with creamy white appressed scales beneath; 3rd segment longer than 2nd, white throughout. Forewing ground color golden yellow; basal and subbasal lines creamy white; golden yellow between subbasal and antemedian lines;

scattering with blackish scales sparsely, with dark brown spot surrounded by white scales; antemedian line S-shaped, convex medially, creamy white, followed by golden yellow zone before postmedian line; apex acute; termen incurved; fringes golden yellow at basal half; R_3 stalked with R_{4+5} before middle; R_4 and R_5 stalked near middle; R_5 to termen; M_1 closer to R-vein at base, almost parallel; M_2 and M_3 connate or stalked; CuA_1 and CuA_2 stalked near 3/5. Hindwing yellowish white, almost transparent; M_2 closer to M_3 at base; M_3 and CuA_1 stalked before 1/3; apex sharply pointed; termen oblique, sinuate; fringes more yellowish. Hindtibia with whitish long scales and dark brown scales around median spurs. Midtibia with whitish scales, dark brown at apex.

Male genitalia (Figs. 27, 27a–b). Uncus slender, relatively long. Gnathos moderate, strongly bent apically, with sharply pointed apex. Valva broad basally, thence narrowed forming narrow neck; distal part ovate, large; costa strongly concave at middle; outer margin somewhat round. Juxta relatively large, with neele-like long lateral lobes. Aedeagus short, more or less stout, narrowed to apex; cornutus consists of a small plate with several dentates near apex.

Female genitalia (Fig. 39). Eighth sternite heavily emarginate at middle. Antrum very wide, short, weakly sclerotized. Ductus bursae slightly longer than corpus bursae, coiled 1–2 times anteriorly; ductus seminalis arising from middle. Corpus bursae relatively large; signum pear-shaped with numerous spicules.

Types. Holotype: male, Nakhon Noyak, Khao Yai, ca. 800 m, 16 VI 1983 (Kuroko, Moriuti, Arita, and Yoshiyasu), preserved in UOP. Paratypes: 1 ♂, 2 ♀, same data as holotype; 1 ♂, 14 VI 1983 (Kuroko, Moriuti, Arita, and Yoshiyasu), gen. prep. no. 4777 (♀); 1 ♀, Chantaburi Ban Trok Nong, ca. 200 m, 5 VI 1983 (Kuroko, Moriuti, Arita, and Yoshiyasu); 1 ♀, Chantaburi Khitchakut, ca. 500 m, 9 VI 1983 (Kuroko, Moriuti, Arita, and Yoshiyasu); 1 ♂, Phangnga Nam Tok Lam Pee ca. 300 m, 16 X 1985 (Kuroko, Moriuti, Arita, and Yoshiyasu), above types are in UOP; 2 ♂, Khao Yai Nat. Park, c. 700 m, 29 IX–6 X 1984 (Karsholt, Lomdholdt, and Nielsen), gen. prep. no. 4842. Types are deposited in ZMC.

Etymology. The specific name is derived from the Greek, “*charis*” (= charming, gracious), corresponding to color of the forewings.

***Torodora aritai* Park, sp. nov.**

(Figs. 10, 28, 28a–b)

Diagnosis. This species is somewhat similar to *T. sciadosa* Wu & Liu, but it can be easily separated by the male genitalia.

Description. Wingspan, 18 mm. Head, tegula, thorax dark brown. Pedicel of antenna elongate, dark brown dorsally; flagellum pale grayish orange, with dark spots on several basal joints. Second segment of labial palpus thickened, dark brown, paler towards apex; 3rd segment longer than 2nd. Forewing brown, wider distally, with small yellowish white patch at 4/5 of costa, with dark brown, elongate spot at end of cell; apex obtuse; termen sinuate; R_3 stalked with R_{4+5} beyond middle, M_3 separate, CuA_1 and CuA_2 stalked. Hindwing with M_3 and CuA_1 stalked near base.

Male genitalia (Figs. 28, 28a–b). Uncus somewhat clavate, with acute apex. Gnathos strongly bent beyond middle. Tegumen with long hairtufts dorsally. Valva broad at basal 2/5 with 6–10 semioval particles on inner surface, and with crescentic sclerite separating basal and distal part medially; costa strongly concave near middle; distal part with round apex. Juxta with a large, tongue-shaped flap at middle anteriorly and an eyebrow-shaped sclerite caudally; caudal margin concave. Vinculum narrow, band-like. Aedeagus stout, broader towards base, as long as valva; with more than 30 bullet-like sclerites, and wrinkled,

membranous conic sack in vesica. Eighth sternite with short median processes on caudal margin.

Types. Holotype: male, Nakhon Noyak, Khao Yai, ca. 800 m, 11–19 XI 1985 (Moriuti, Saito, and Arita), gen. prep. no. 4737. Paratype: 1 ♂, Loei: Phu Rua, ca. 800 m, 9 VIII 1987 (Kuroko, Moriuti, Arita, and Yoshiyasu). Types are preserved in UOP.

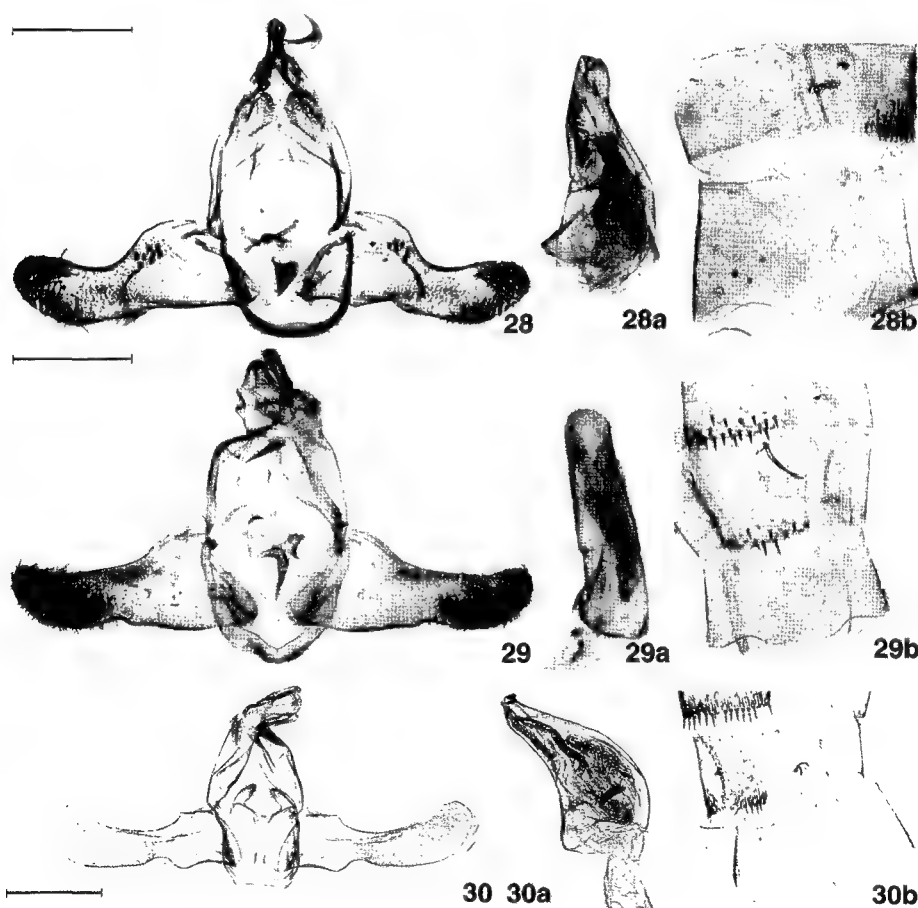
Etymology. *Torodora aritai* is named in honor of Dr. Yutaka Arita, who is one of collector of the type and a well known microlepidopterist in Japan.

***Torodora chumphonica* Park, sp. nov.**

(Figs. 11, 29, 29a–b)

Diagnosis. This species is somewhat similar to the preceding new species, *T. aritai* sp. nov. but it can be easily separated by the male genitalia.

Description. Wingspan, 15 mm. Head, tegula, thorax dark brown. Pedicel of antenna elongate, pale grayish orange, dark brown dorsoposteriorly; flagellum pale grayish orange, with dark spots on 6–8 basal joints. Second segment of labial palpus thickened, dark brown at



Figs. 28–30. Male genitalia (a: aedeagus, b: 8th segment): 28. *T. aritai* sp. nov.; 29. *T. chumphonica* sp. nov.; 30. *T. parotidosa* Wu. (Scale = 0.5 mm).

basal 2/3 and pale brownish gray at distal 3rd; 3rd segment as long as 2nd, dark brown at base. Forewing brown throughout, wider distally; discal spots inconspicuous; apex obtuse; termen sinuate; fringes concolorous; R_2 arsing from near upper angle of cell; R_3 stalked with R_{4+5} beyond middle, R_4 and R_5 separated near 4/5, M_2 and M_3 approximated, CuA_1 and CuA_2 stalked beyond middle. Hindwing with M_3 and CuA_1 stalked near base. Hindtibia with grayish orange scales at basal 1/3, dark brown scales beyond it, and grayish orange at apex; median spur dark brown, apical spur dark brown beyond half.

Male genitalia (Figs. 29, 29a–b). Uncus stout, with round apex. Gnathos strongly bent beyond middle. Valva broad at base; costa gently obliqued before basal 1/3 and thence almost straight; ventral margin with emargination beyond middle. Lateral lobes of juxta quadrate, with long tail. Aedeagus almost straight, as long as valva, with numerous spicules in vesica. Eighth sternite convex medially on caudal margin.

Type. Holotype: male, Chum phon, Lungsuan, 3 VIII 1981 (Kuroko, Moriuti, Arita, and Yoshiyasu), gen. prep. no. 4725. Type is preserved in UOP.

Etymology. The specific name is derived from the type locality.

***Torodora parotidosa* (Wu, 1994), comb. nov.**

(Figs. 12, 30a–b)

Toxotarca parotidosa Wu, 1994, Sinozoologia 11: 123, figs. 5; Wu, 1997: 80, figs. 5–1.

Diagnosis. There is a little difference from the type specimen in the male genitalia with more deeply emarginated ventral margin of valva, but it is considered that the difference is an infraspecific variation. Wingspan, 19 mm.

Male genitalia (Figs. 30a–b). Uncus slender, bent downwardly; apex not clavate. Gnathos moderate. Valva strongly angled at basal 1/5 of costa, then gently incurved; distal part fairly elongate with round apex; ventral margin almost straight at basal 1/3, thence deeply emarginate. Juxta with thumb-like lateral lobes, bent inwardly. Saccus almost straight on anterior margin. Aedeagus very broad at base, relatively short, narrowed apically, with spinous zone on distroventral surface; cornuti consist of one spatulate plate with long coiled lobes and two plates bearing spicules; one long and the other short, leaf-like.

Material examined. 3 ♂, Nakhon Nayok Prov., Khao Yai Nat. Park, ca. 70 m, 29 IX–6X 1984 (Karsholt, Lomholdt & Nielsen), gen. prep. no. 4843; 1 ♂, Phu Luang Wildlife Sanctuary, 700–900 m, 8–14 X 1984 (Karsholt, Lomholdt, and Nielsen), 1 ♂, Nakhon Noyak, Khao Yai, ca. 800 m, 11–19 XI 1985 (Moriuti, Saito, and Arita), gen. prep. no. 4723.

Distribution. Thailand (new record), China (Heinan Prov.).

Remarks. Wu(1994) established *Toxotarca* Wu (monotype), separating from *Torodora* by the 2nd segment of the labial palpus with roughly erect scales ventrally, however, I treat this genus as a junior synonym of *Torodora*.

***Torodora pegasana* Wu et Liu, 1994**

(Figs. 13, 31, 31a–b)

Torodora pegasana Wu et Liu, 1994. Sinozoologica 11: 163, fig. 5 (TL: Hainan, China).

Diagnosis. Wingspan, 19 mm. This species is very similar to *T. aenoptera* Gozmany, which described from Fujian, China, and *T. capillaris* Park from Taiwan, but can be separated from *T. aenoptera* by the clavate apex of uncus (whereas in the latter the uncus expanded latero-distally with an emargination on caudal margin), and from *T. capillaris* by the shape of valva.

Male genitalia (Figs. 31, 31a–b). Uncus clavate, with round apex. Gnathos strongly bent preapically. Valva broad at base, with a bundle of hair pencils before middle. Juxta quadrate,

lateral lobes not developed. Aedeagus broad basally, bent at basal 1/3, with a bundle of needle-like cornuti. Eighth sternite with median expansion on caudal margin.

Material examined. 1 ♂, Nakhon Nayok Prov., Khao Yai Nat. Park, ca. 70 m, 29 IX–6X 1984 (Karsholt, Lomholdt, and Nielsen), gen. prep. no. 4844.

Distribution. Thailand (new record), China (Heinan Prov.).

***Torodora pentagona* Park, sp. nov.**

(Figs. 14, 32, 32a–b)

Diagnosis. This species is similar to *T. aritai* sp. nov. in the superficial appearance, but it is much smaller, and can be differentiated from the latter and its allies by the pentagonal shape of uncus, and long, needlelike, strong hair-pencils on inner surface of valva distally in the male genitalia.

Description. Male. Wingspan, 14 mm. Head brown with lateral tuft pale grayish orange. Tegula and thorax brown. Pedicel of antenna pale brownish orange on dorsal and ventral surface, but dark brown on anterior and posterior surface; flagellum pale brownish orange throughout. Second segment of labial palpus dark brown, except apex and preapical area on outer surface, with dark brown preapical band; 3rd segment slightly longer than 2nd, dark brown ventrally. Forewing similar to that of *T. aritai* sp. nov. in color pattern; ground color brown, wider distally, with small yellowish white patch at 4/5 of costa, with dark brown elongate spot at end of cell and small one at middle; apex obtuse; termen sinuate; venation also similar to that of *T. aritai*. Hindwing gray; apex somewhat acute; termen sinuate. Hindtibia dark brown scales beyond basal 1/3, and grayish orange at apex; median spur very long, about 1/2 of tibia, dark brown dorsally.

Male genitalia (Figs. 32, 32a–b). Uncus almost pentagonal with acute apex. Gnathos strongly bent beyond middle. Valva almost similar to that of *T. pegasana*, but with strong hair pencils on inner surface of distal part; caudal margin of juxta concave, with short lateral lobes. Aedeagus globula basally, as long as valva, with plate of numerous spicules in vesica.

Types. male, Nakhon Noyak, Khao Yai Nat. Park, ca. 800 m, 11–19 XI 1985 (Moriuti, Saito, and Arita), gen. prep. no. 4764; Paratype: 1 ♂, Loei, Phu Rua, ca. 800 m, 15–19 VIII 1987 (Kuroko, Moriuti, Arita, and Yoshiyasu), gen. prep. no. 4766. Types are preserved in UOP.

Etymology. The specific name is derived from the Greek, “*pente*” (= five), referring to the shape of uncus.

***Toxotarca flavescens* Gozmany, 1978**

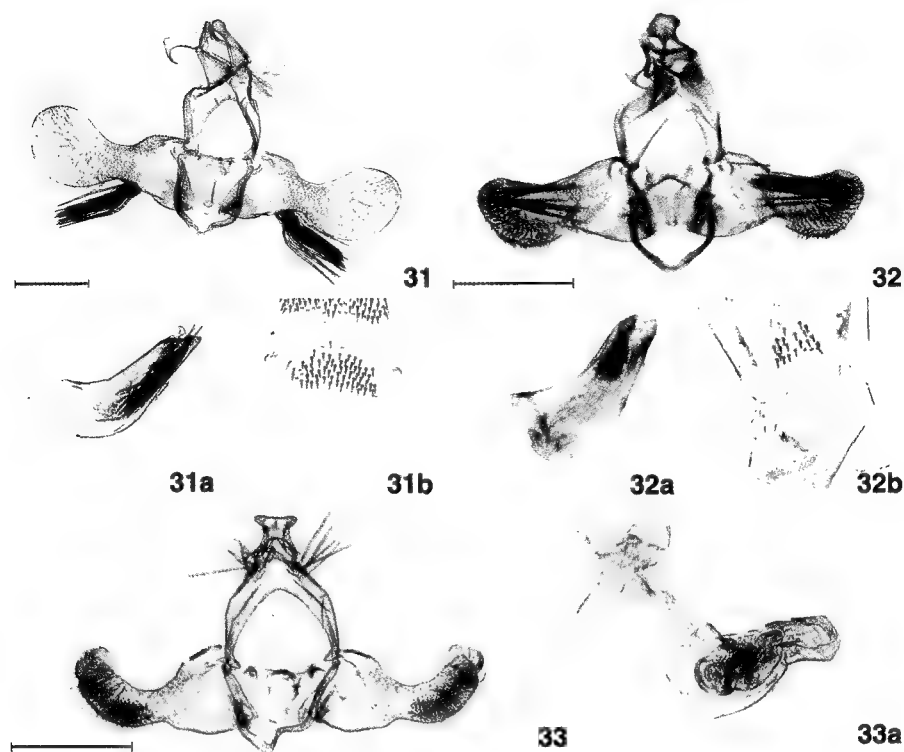
(Figs. 15, 33, 33a–b, 40)

Toxotarca flavescens Gozmany, 1978, Microlep. Pal. 5: 221, fig. 147; Wu, 1997: 64, figs. 1–5 (TL: Szetschwan, Mt. Omei, China).

Diagnosis. Wingspan, 14–14.5 mm. The species was described from the southern part of China. It is externally very similar to the preceding species, but can be differentiated by the male genitalia.

Male genitalia (Figs. 33, 33a–b). Uncus widely expanded distally, concave on caudal margin. Valva extremely broad at basal 1/3, thence narrowed; distal part foot-shaped, with almost straight outer margin. Juxta broad, short; lateral lobes very short, setosed apically. Aedeagus short, globula basally, with numerous spicules in vesica.

Female genitalia (Fig. 40). Apophysis anterioris short, about 1/4 length of apophysis posterioris. Caudal margin of 8th sternite strongly emarginate medially, with dense spicules on surface. Ductus bursae narrowed at distal 1/4 and broad beyond it, with 4–5 conical spines;



Figs. 31-33. Male genitalia (a: aedeagus, b: 8th segment): 31. *T. pegasana* Wu & Liu; 32. *T. pentagona* sp. nov.; 33. *T. flavescens* Gozmany. (Scale = 0.5 mm).

ductus seminalis arising from middle, relatively broad with dense spicules. Corpus bursae ovate; signa consist of one heavily sclerotized, long, spiculate plate and the other one very long, weakly sclerotized, bearing weak conical spines on surface.

Material examined. 1 ♂, Nakhon Noyak, Khao Yai, ca. 800 m, 11-19 XI 1985; 1 ♂, same locality, 8 VIII 1987 (Moriuti, Saito, Arita, and Yoshiyatsu), gen. prep. no. 4772(♂); 1 ♂, 2 ♀, same locality, 23-24 IX 1987, prep. no. 4782(♀), 4770(♀), 4771(♂); 2 ♀, 16 & 19 VI 1983 (Kuroko, Moriuti, Arita, and Yoshiyatsu), gen. prep. no. 4762.

Distribution. Thailand (new record), China (Chekiang Prov.).

***Torodora moriyasu* Park, sp. nov.**

(Figs. 16, 34, 34a-b)

Diagnosis. This species is very similar to the following two new species in the superficial appearance, but can be easily distinguished by the absence of the strong spine on ventral margin of valva in the male genitalia.

Description. Male. Wingspan, 14-15 mm. Head, tegula, thorax brown. Pedicel of antenna brown on dorsal and ventral surface, but dark brown on anterior and posterior surface; flagellum pale brownish orange throughout, with dark brown annulations. Second segment of labial palpus brown on outer surface, paler with oblique, dark brown preapical band on inner surface; 3rd segment longer than 2nd, with dark brown band near base, dark brown ventrally.

Forewing light brown throughout; color pattern similar to that of *T. pentagona* sp. nov., with blackish spots near middle of cell and below it, and two discal spots at upper and lower corner of cell; apex obtuse; termen sinuate; R_3 stalked with R_{4+5} near middle, R_4 and R_5 separated from beyond $4/5$, CuA_1 and CuA_2 stalked beyond middle. Hindwing gray, with M_2 approximated to M_3 at base; M_3 and CuA_1 stalked before basal $1/4$; apex somewhat acute; termen sinuate. Hindtibia dark brown scales above, with creamy white scales at apex.

Male genitalia (Figs. 34, 34a–b). Uncus more or less slender, narrower to apex. Basal part of gnathos broadly expanded, tongue-shaped. Valva elongate, slightly expanded distally; apex somewhat acute; ventral margin without strong spine. Juxta with short, digitate caudal lobes laterally. Vinculum narrow, forming band. Aedeagus very stout, wider towards base, as long as valva; a row of conical spines and spicules in vesica. Eighth sternite almost quadrate, with prominent median expansion on caudal margin.

Types. Holotype: male, Nakhon Nayok Prov., Khao Yai Nat. Park, ca. 800 m, 7 VIII 1987 (Moriuti, Saito, Arita, and Yoshiyasu), gen. prep. no. 4739. Paratype: ♂, same locality, 10 VIII 1987 (Moriuti, Saito, Arita, and Yoshiyasu), gen. prep. no. 4751. Types are preserved in UOP.

Etymology. *Torodora moriyasu* is named in honor of Drs. S. Moriuti and Y. Yoshiyasu. The specific epithet is formed from parts of two proper names and treated as a noun in apposition.

Remarks. This species and following two species are a separable group from the ordinary members of the genus *Torodora* by having characteristic structure on 8th segment, with median expansion bearing short lateral processes laterally on anterior margin. However, these three species are should be placed in this genus, due to the simiarity of their external character and venation of both wings.

***Torodora sagmaria* Park, sp. nov.**

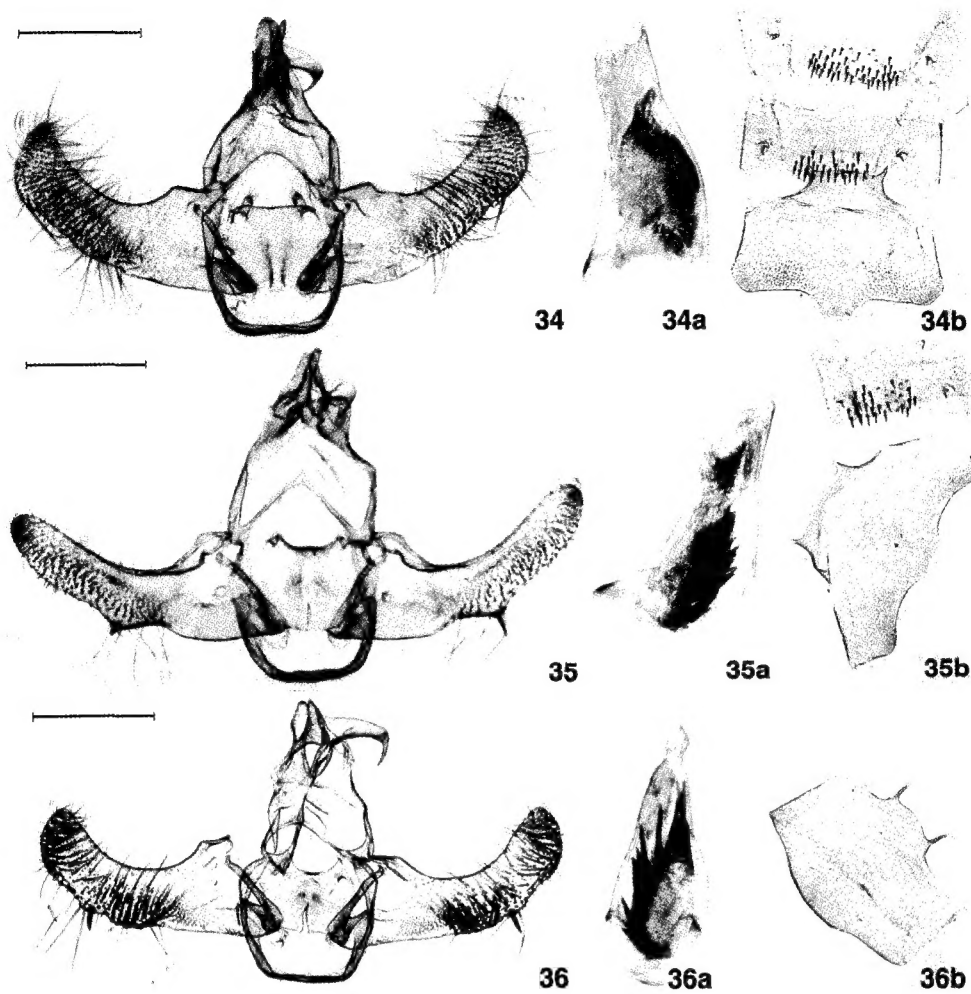
(Figs. 17, 35, 35a–b)

Diagnosis. This species is very similar to the preceding new species in the superficial appearance, but can be easily distinguished from the latter by the absence of annulations on antenna and with a strong spine on ventral margin of the valva in the male genitalia.

Description. Male. Wingspan, 14 mm. Head brown, with creamy white erect scales laterally, Tegula and thorax brown. Pedicel of antenna pale grayish orange; flagellum pale brownish orange throughout, without distinct annulations. Second segment of labial palpus relatively thick, short, brown on outer surface, with dark brown apex; paler with dark brown preapical band on inner surface; 3rd segment as long as 2nd, brownish. Forewing brownish throughout; color pattern similar to the preceding species but darker, discal spots invisible; apex obtuse; termen sinuate; R_3 stalked with R_{4+5} near middle, R_4 and R_5 separated from near $2/3$, CuA_1 and CuA_2 stalked about $1/3$. Hindwing gray, with M_3 and CuA_1 stalked near base.

Male genitalia (Figs. 35, 35a–b). Uncus more or less slender, with almost parallel lateral margins; apex round. Basal part of gnathos expanded dorsocaudally, but not so broad as that of the preceding species. Valva elongate, slender; costa gently incurved; ventral margin with a strong spine medially. Juxta with short, digitate caudal lobes (these lobes are much shorter than those of the preceding species, but larger than following species). Vinculum narrow, band-like. Aedeagus very stout, broader towards base, slightly shorter than valva; a row of long, strong spines, from base to $2/3$ length of aedeagus, and a series of short conical spines presented beyond $2/3$. Eighth sternite almost triangular, concave with median expansion on caudal margin; with relatively short lateral lobes on median expansion of anterior margin.

Type. Holotype: male, Chiang Mai, Fang, ca. 700 m, 13–16 IX 1987 (Moriuti, Saito, Arita, and Yoshiyasu), gen. prep. no. 4758. Paratype: 1 ♂, same data as holotype. Types are pre-



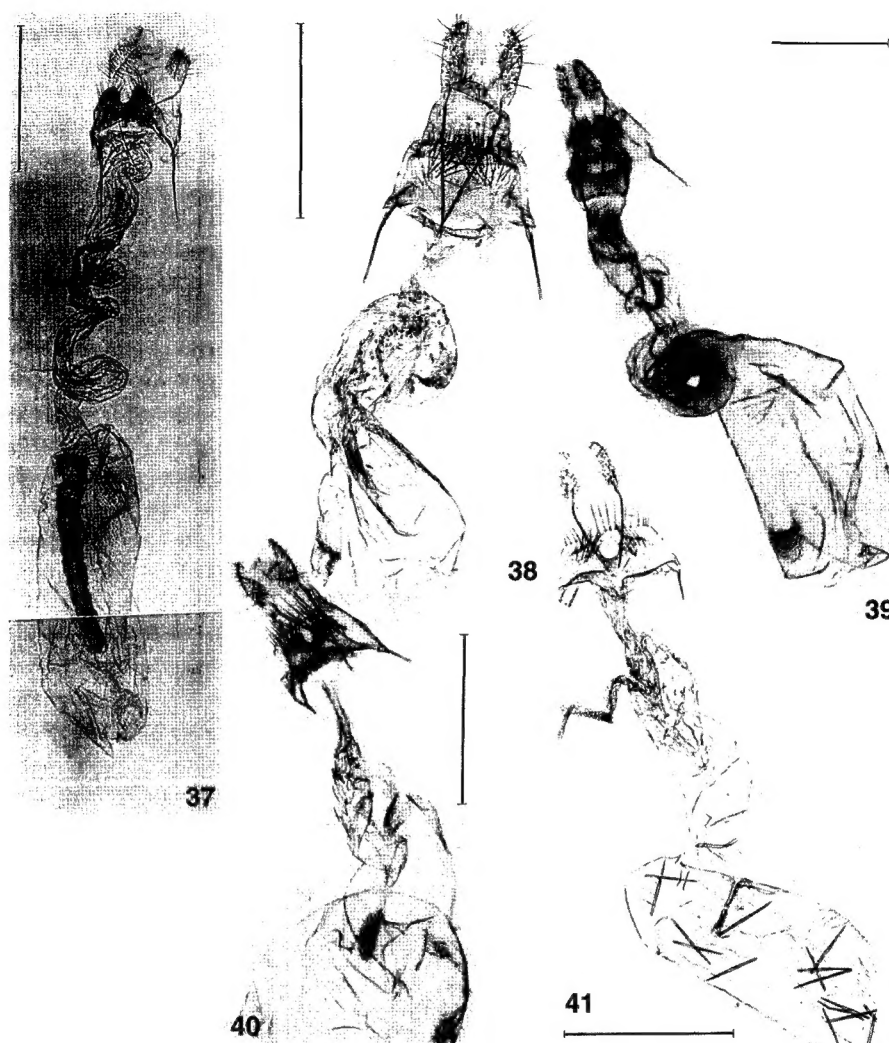
Figs. 34-36. Male genitalia (a: aedeagus, b: 8th segment): 34. *T. moriyasu* sp. nov.; 35. *T. sagmaria* sp. nov., 36. *T. chiangoica* sp. nov. (Scale = 0.5 mm).

served in UOP.

Etymology. The specific name is derived from the Geek, “*sagma*” (= pack-saddle), referring to the shape of the 8th segment.

***Torodora chiangoica* Park, sp. nov.**
(Figs. 18, 36, 36a-b, 41)

Diagnosis. This species is very similar to the preceding two new species in superficial appearance, but can be easily distinguished from *moriyasu* sp. nov. by having strong spine on ventral margin of valva, and also can be differentiated from *sagmaria* sp. nov. by the shape of valva and aedeagus; valva shorter and aedeagus narrowed towards apex, with longer, stronger spines in vesica.



Figs. 37-41. Female genitalia: 37. *T. karsholti* sp. nov.; 38. *T. epiphorana* sp. nov.; 39. *T. epicharis* sp. nov.; 40. *T. flavescens* Gozmany; 41. *T. chiangdoica* sp. nov. (Scale = 1 mm).

Description. Male. Wingspan, 13–14 mm. Head dark brown, with creamy white erect scales on anterior 1/3 laterally. Tegula and thorax dark brown. Pedicel of antenna dark brown all around; flagellum pale brownish gray, with dark brown annulations. Second segment of labial palpus relatively long, slender, brown with oblique, dark brown preapical band on outer surface; 3rd segment longer than 2nd, dark brown ventrally. Forewing very similar to those of *T. moriyasu* sp. nov., but narrower; Hindwing with M_2 for from M_3 at base; M_3 and CuA_1 stalked near basal 1/3.

Male genitalia (Figs. 36, 36a–b). Uncus somewhat clavate with acute apex, with expansion medially. Basal part of gnathos narrowed triangularly at apex. Valva elongate, but shorter than preceding species; costa strongly incurved; ventral margin with strong spine medially. Juxta with very short, almost vestigial caudal lobes ventrolaterally; caudal margin incurved. Vincu-

lum narrow, taeniod. Aedeagus very stout, narrowed toward apex, forming a snake head; cornuti consist of 5–10 long, horn-shaped spines and several small ones. Eighth sternite almost quadrate, convex on caudal margin; anterior margin with median expansion bearing two long lateral lobes.

Female genitalia (Fig. 41). Apophysis anterioris short, shorter than 1/3 of apophysis posterioris. Caudal margin of 8th sternite strongly emarginate medially. Ductus bursae narrowed at distal 1/4 and broad beyond it; ductus seminalis arising from middle, narrow, with dense spicules on inner surface. Corpus bursae elongate; signum elongate transversally, divided into two bars at middle with small particles.

Types. Holotype: male, Chiang Mai, Phliu, 8 VI 1983 (Kuroko, Moriuti, Arita, and Yoshiyasu), gen. prep. no. 4755; Paratypes: 1 ♀, same data as the holotype, gen. prep. no. 4784; 1 ♂, Chiang Mai, Doi Paktia, ca. 1500 m, 5–7 IX 1987 (Moriuti, Saito, Arita, and Yoshiyasu), gen. prep. no. 4750; 1 ♂, Chiang Mai, Fang, ca. 450 m, 15 V 1983 (Kuroko, Moriuti, Arita, and Yoshiyasu); 1 ♂, Chiang Mai, Fang, ca. 700 m, 13–16 IX 1987 (Moriuti, Saito, Arita, and Yoshiyasu), gen. prep. no. 4759; 1 ♂, 1 ♀, Chiang Mai, Phliu, ca. 100 m, 23 & 26 VIII 1987 (Moriuti, Saito, Arita, and Yoshiyasu); 1 ♀, Chanthaburi, Nam Tok Klong, Narai, ca. 200 m, 6–7 X 1985 ((Kuroko, Moriuti, Arita, and Yoshiyasu), gen. prep. no. 4783. Types are deposited in UOP.

Etymology. *Torodora chiangdoica* is derived from the type locality, consisting of parts of two proper names in apposition.

DISCUSSION

As Park and Heppner (2000) discussed on the venation of the genus *Torodora*, there are considerable variations within the genus, especially in M_2 and M_3 on the forewing and M_3 and CuA_1 on the hindwing. M_3 and CuA_1 of the hindwing free or connate in the type species and some other members, including *octavana* Meyrick and *loecia* sp. nov., but those of the species described here are almost stalked. The structure of the male genitalia in the genus are also variable, with usually foot-shaped or simply elongate valva, and well developed uncus. However, several species which have similar venation, were not included in this article, due to somewhat different structure of the male genitalia. Thus, a further study is needed to define the characteristics of the male genitalia for the genus.

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